

## **REMARKS**

Claims 50-58 are pending in the subject application. Applicants respectfully request entry of new claims 59-65. In the Office Action, claims 50-58 are rejected under 35 U.S.C. §102. More specifically with regards to the 35 U.S.C. §102 rejections, Claims 50-58 were rejected under 35 U.S.C. §102(e) as being anticipated by U. S. Patent No. 5,700,518 issued to Lee et al ("Lee"), and under 35 U.S.C. § 102(b) as being anticipated by U. S. Patent No. 5,560,839 issued to Bennett et al. ("Bennett") or by U. S. Patent No. 5,380,408 issued to Svensson ("Svensson") or U.S. Patent Nos. 5,567,526 or 5,236,740 issued to Peters ("Peters"). Applicants herein submit the following remarks and arguments to overcome the rejections and to enter the new claims.

### **Claim Rejections under 35 U.S.C. § 102**

Claims 50-58 are rejected under 35 U.S.C. § 102 as being anticipated by various issued patents. In the Office Action, the Examiner stated that the Applicants' arguments filed on 12-23-02 were fully considered but they are not persuasive. The Examiner further stated that inserting the phrase "substantially intact hard constituent particles" does not overcome the prior art that shows the "claimed protective coating on claimed substrate". It is the Examiner's opinion that the art shows that the carbide particles remain in a layer without the binder where the coating is applied.

Applicants again respectfully disagree and herein expand the previously submitted arguments. The claims of the subject application are directed to an article, comprising a composite portion comprising hard constituent particles in a binder, an etched surface region substantially free of eta phase, the etched surface portion

comprising substantially intact hard constituent particles and voids between the substantially intact hard constituent particles, wherein the voids extend to the composite portion, and a wear resistant coating on the etched surface region and disposed in the voids. The phrase "substantially intact hard constituent particles" means that the particles have not been substantially etched by the process used to remove the binder from the etched surface portion. In other words, the hard constituent particles of the etched surface portion are substantially similar to the hard constituent particles of the composite portion. However, the binder material is removed from between the substantially intact hard constituent particles of the etched surface portion to create voids. The cited prior art references, as individually discussed below, do not include the structure of the article as described in the limitations of independent claims 50 or 59 or claims 51-58 and 60-65 dependent therefrom.

In the Office Action, the pending claims in the subject application are rejected based on five references, which in the Examiner's opinion anticipate the pending claims under either 35 U.S.C. § 102 (b) or (e). Yet, according to § 2131 of the MPEP, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Applicants respectfully submit that claimed article is patently distinct from the cited prior art since the articles do not disclosed each and every element as set forth in the claim. The references may disclose a substrate and a coating, but the structures of the articles in the references are different than the claimed article. The articles disclosed in the prior art comprise a different structure between the coating and the substrate than the article claimed in the subject application. Each structure takes a different approach to

increasing the adherence of the coating to the substrate. Applicants herein discuss these structural differences. All citations refer to the prior art reference unless otherwise stated.

**U. S. Patent No. 5,700,518 issued to Lee et al.**

Lee discloses a method of producing a coated composite material substrate that comprises first etching of the hard constituent of the composite material by an electrolytic etching process or a liquid chemical etching. *See column 2, lines 45 - 59.* In a cemented carbide object, this method produces a substrate wherein the "carbide phase of the cemented carbide is irregularly etched". *See column 2, lines 62 - 66.* Subsequently, the substrate is further etched "resulting in the removal of the cobalt binder phase". *See column 3, lines 3 - 6.*

By sharp contrast, the claimed article involves etching a portion of a surface of the hard constituent of the composite material by contacting the surface with a gas flow that is composed of an etchant gas and a second gas for removal of the desired amount of binder phase. Whereas Lee requires the subsequent removal of the cobalt binder phase (i.e. the eta phase), the claimed article is initially free of eta phase deposits on the substrate since the second gas is one that does not react with the substrate or the removed binder material and does not alter the oxidation state of the substrate during the etching step. Therefore, by using different etching materials, and by creating a product substantially free of eta phase, the disclosures of Lee do not include each element as set forth in the claims.

Furthermore, as set forth in the claims, the claimed article comprises substantially intact hard constituent particles. The article described in Lee does not

includes a surface wherein the carbide phase, or hard constituent particles, are irregularly etched and, therefore not substantially intact. Thus, the disclosure of Lee does not include each element as set forth in the claims.

**U. S. Patent No. 5,560,839 issued to Bennett et al.**

Bennett discloses a method of producing a coated composite material substrate that comprises a first etching of the binder material and a second etching to remove the tungsten carbide to a desired depth. *See column 5, lines 21-28.* As described above, the claimed article of the subject application comprises substantially intact hard constituent particles and voids between the particles in an etched surface portion. The disclosure of Bennett does not comprise substantially intact hard constituent particles in a surface region; in fact, the carbide particles are purposefully etched. In the claimed invention, the binder phase is removed from a surface of the substrate during the first and only etching step, while in Bennett's disclosure, that does not occur until the second step. Therefore, the disclosure of Bennett does not include each and every element as set forth in the claims.

Even assuming for the sake of argument that each and every element is met, and further assuming Bennett discloses using the same tungsten carbide substrate with the same protective coating, the removal of binder in Bennett's invention is not necessarily full and substantial. *See column 21, claim 22 and column 22, claim 39.* Thus, this lack of specificity would not anticipate the elements set forth in these claims. MPEP § 2131.03.

**U. S. Patent No. 5,380,408 issued to Svensson**

Svensson discloses a method of producing a coated composite material substrate that has been processed so that the "cobalt layer on the surface will be effectively removed whereas the cobalt in the channels between the hard material grains will not be etched away. The binder phase layers between the carbide grains, which are necessary for the strength of the cemented carbide are not affected." See *column 2, lines 39-45*.

The method and resultant product of Svensson produces the opposite result and structure of the claimed article of the subject application. As discussed above, the claimed article of the subject application comprises an etched surface region comprising voids between the substantially intact hard constituent particles. The product described in Svensson does not include these voids and actually teaches away from creating these voids by arguing the absence of voids is "necessary for the strength of the cemented carbide." See *column 2, lines 43-45*. The claimed article of the present invention comprises a protective coating disposed in the voids. Obviously, if the product of Svensson does not include voids, a protective coating may not be disposed in the voids. The article described in Svensson does not include each and every element as set forth in the claim. Indeed, the disclosures are distinguished from materials with etched voids, making the prior art of Svensson patently different from the claimed article. See *Figure 1 and column 3, lines 59-60*.

**U. S. Patents No. 5,567,526 and 5,236,724 issued to Peters et al.**

Peters discloses a method of producing a coated composite material substrate that has a surface layer of hard constituent particles removed and only some

of the binder material removed. *See column 3, lines 23-41.* Peters describes a process that is said to increase the adhesion of an applied coating to a composite material substrate by removal of the surface carbide, or hard constituent material. The process of Peters comprises two etching steps. The first etch “removes a small amount of the tungsten carbide at the surface of the substrate while leaving the cobalt binder substantially intact. The substrate is then subjected to a process which removes any residue remaining on the surface as a result of the performance of the process which removes the tungsten carbide.” *See column 2, lines 57-62.* The primary purpose of this process appears to be the etching of the tungsten carbide and removal of the residue of this process. A by-product of the Peters process is the removal of “some” of the binder material. The substrate claimed in the subject application is patently distinct from the substrate produced by the process of Peters, who does not even disclose a wear resistant coating disposed from the voids, a key element set forth in the claims. The claimed article of the subject application comprises an etched surface region comprising substantially intact hard constituent particles and voids between the particles, not removed constituent particles as a result of etching as described in Peters. The article described in Peters does not include each and every element as set forth in the claims.

### **New Claims**

Claim 59 is merely claim 57 written in independent form and claims 60-65 are dependent from claim 59. As in the previously amended claims 50-58, claims 59-65 of the subject application are directed to an article, comprising a composite portion comprising hard constituent particles in a binder, an etched surface region substantially

free of eta phase, the etched surface portion comprising substantially intact hard constituent particles and voids between the substantially intact hard constituent particles, wherein the voids extend to the composite portion, and a wear resistant coating on the etched surface region and disposed in the voids. The phrase “substantially intact hard constituent particles” means that the particles have not been substantially etched by the process used to remove the binder from the etched surface portion. In other words, the hard constituent particles of the etched surface portion are substantially similar to the hard constituent particles of the composite portion. The binder material is removed from between the substantially intact hard constituent particles to create voids. As discussed above, all elements of this structure are not disclosed in any of the prior art cited above.

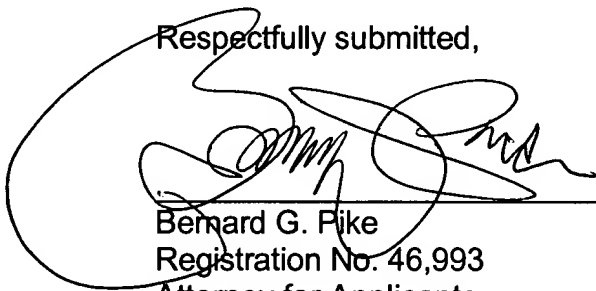
Unlike independent claim 50, independent claim 59 is directed to a substrate specifically coated with an MT-milling coating – i.e. a wear resistant multi-layer insert coating comprised of two TiN layers of approximately 1 micron with a TiCN layer of approximately 3 microns disposed between the two TiN layers. None of the prior art anticipates this unique coating on a substrate. Only a diamond coating is disclosed by Lee (*Column 2, Lines 8, 26-27; Claims 1,4*), Bennett (*Column 1, Lines 12, 57; Column 3, Lines 15, 19; Column 5, Lines 44-45*), and Peters (*Column 1, Lines 10, 11, 32-33, 54; Column 2, Line 55*). While Svensson discusses using metal carbides, oxides, or nitrides such as TiC, TiN, or Al<sub>2</sub>O<sub>3</sub> (*Column 1, Lines 19-20; Column 3, Line 35*), either individually or in a mixture, as a coating, it never mentions using any of those components in a separately layered form as in the claimed article, nor does it mention TiCN as a coating element. Its only specific example, a mixture of TiC, TaC, and NbC

(Column 3, Line 52) is neither the same coating nor the same layered structure as in the claimed article. Thus, the prior art does not anticipate the article claimed in new claims 59-65.

### CONCLUSION

For the reasons discussed above, none of the cited references describe each and every element of the article of claims 50-58 or new claims 59-65. Accordingly, withdrawal of the rejection under 35 U.S.C. § 102 for each reference and reconsideration of these claims, and consideration of the new claims, is respectfully requested. Furthermore, it is asserted that based on the clear distinctions between the claims of the subject application and the references set forth above, no reference or combination of references cited by the Examiner suggests the claimed article. Accordingly, it is respectfully submitted that the claims of the subject application cannot be said to be rendered obvious by the teachings of the cited references in any combination. In view of the foregoing amendments, Applicants respectfully submit that the subject application is in condition for allowance.

Respectfully submitted,



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